



# 2022 Manufacturing Energy Consumption Survey: *Highlights from Data Releases 1 & 2*

## *2022 Manufacturing Energy Consumption Survey*

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U.S. Energy Information Administration  
Office of Energy Statistics  
U.S. Department of Energy  
Washington, DC 20585

This publication is available at  
<https://www.eia.gov/consumption/manufacturing>

\* Note: As additional 2022 MECS data are released, this report will be updated.

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## What is the *Manufacturing Energy Consumption Survey* (MECS)?

MECS is the only nationally representative source for estimates of energy-related characteristics, consumption, and expenditures for manufacturing establishments in the United States.

The U.S. Energy Information Administration (EIA) collects data for manufacturing establishments mainly through web questionnaires.

- EIA drew the 2022 MECS sample size of approximately 15,000 establishments from a national sample frame representing approximately 97% of the manufacturing payroll. We estimate the sample to represent at least that percentage of manufacturing energy consumption.
- This sample allows us to report separate estimates of energy use for 21 three-digit manufacturing subsectors and 50 industry groups and industries, as defined by the North American Industry Classification System (NAICS).

EIA has conducted the MECS periodically since 1985.

- The 2022 MECS is the 11<sup>th</sup> iteration.



## Key takeaways from EIA's 2022 MECS data releases 1 and 2

- Growth in gross output continues to outpace manufacturing energy consumption growth, resulting in an overall decrease in energy intensity.
- From 1998 to 2022, manufacturing energy intensity decreased by 52%. During this same period, manufacturing gross output increased by 81%, implying continued energy efficiency gains.
- Nonfuel consumption (or using energy as a feedstock or raw material input rather than for fuel) is dominant in the chemicals industry.
- Four industries—chemical, petroleum and coal products, paper, and primary metals—account for most manufacturing energy consumption.
- Most subsectors cannot easily switch from natural gas to an alternative fuel.
- The chemicals, petroleum and coal products, paper, primary metals, food, and paper sectors accounted for 74% of manufacturing energy expenditures in 2022, with the chemical sector accounting for 40% of the total.
- More than half (55%) of manufacturing energy consumption came from establishments with a value of shipments and receipts over \$500 million.



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# Manufacturing energy consumption

Manufacturing is the physical, mechanical, or chemical transformation of materials or substances into new products. Manufacturing operations are generally conducted in facilities described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. In addition, assembling the components of manufactured products (for example, blending materials, such as lubricating oils, plastics, resins, or liquors) is considered manufacturing.

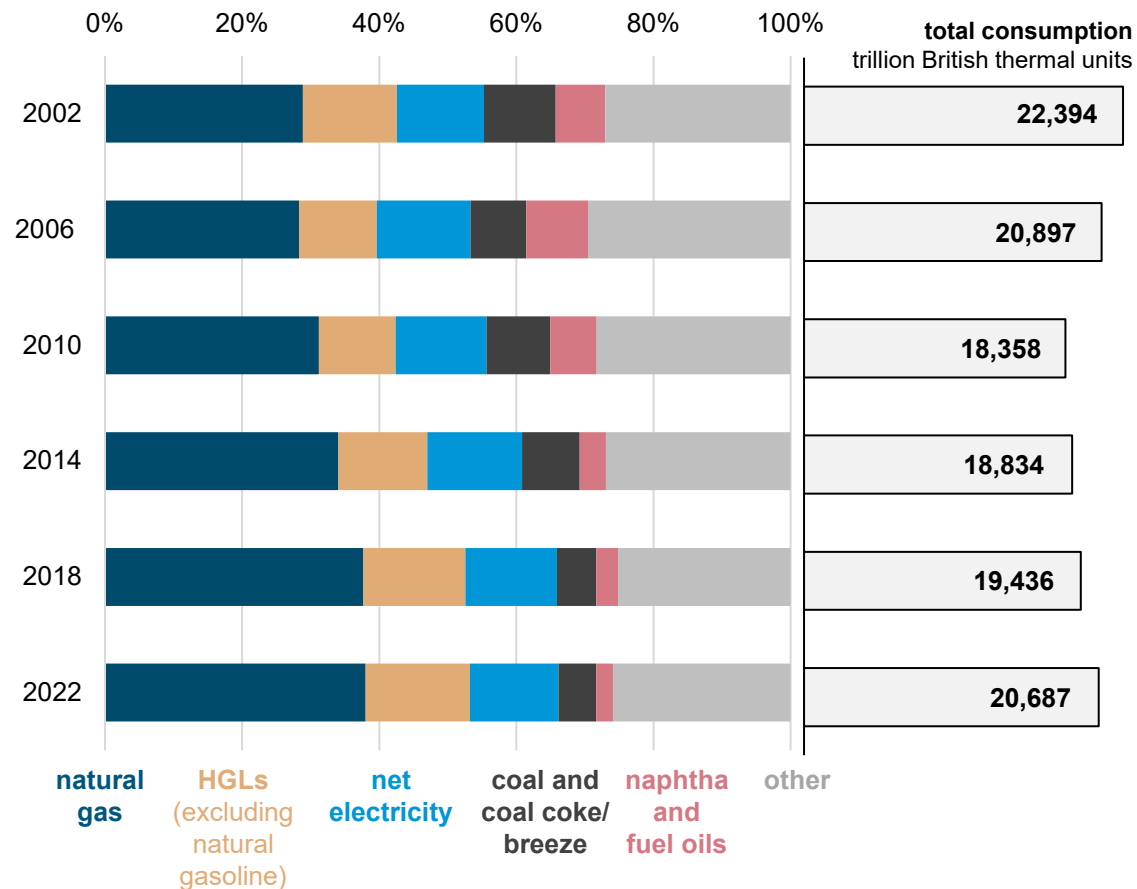
An establishment is an economic unit at a single location where manufacturing is performed. Manufacturing establishments are classified by the North American Industrial Classification System (NAICS), which categorizes establishments according to the types of production processes they primarily use.

Manufacturers have two types of energy consumption—*fuel* and *nonfuel*. *Fuel* consumption is the use of any substance that can be burned to create heat, produce power, or to generate electricity. *Nonfuel* consumption is the use of energy as feedstock or raw material input.

# Natural gas and HGLs continue to increase their shares of total consumption

Proportion of total consumption by energy source and year, 2002–2022

percentage



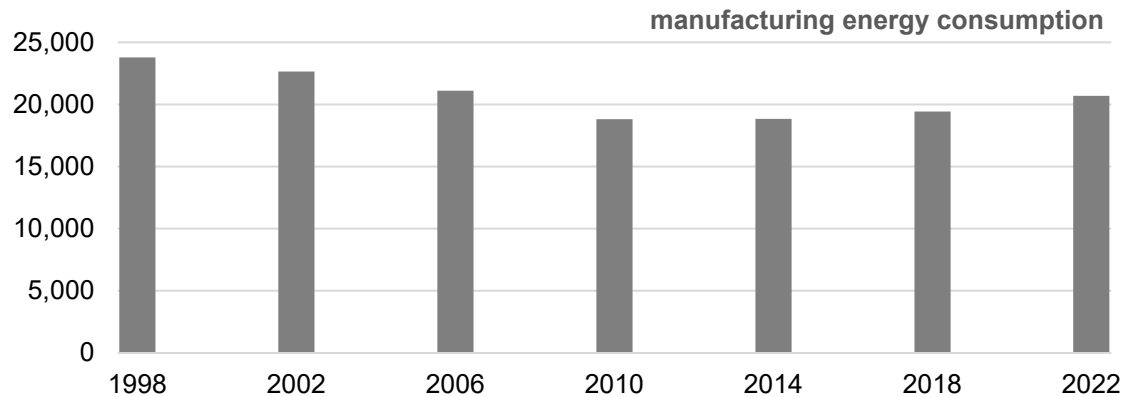
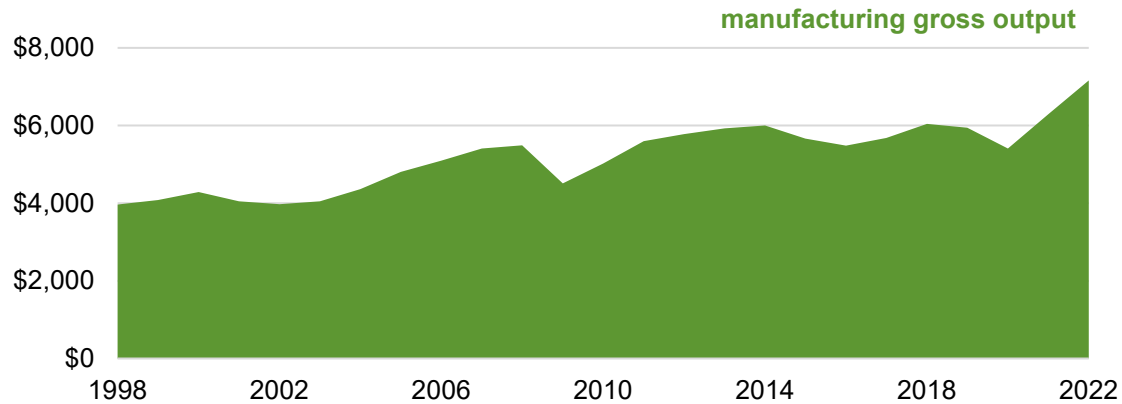
- MECS estimates that manufacturing first-use energy consumption in 2022 totaled 20,687 trillion British thermal units (Btu).
- Natural gas and hydrocarbon gas liquids (HGLs\*) continue to increase as shares of total consumption, rising from an estimated 43% of consumption in 2002 to an estimated 53% in 2022.
- Conversely, the estimated use of coal and coal coke/breeze as well as naphtha and fuel oils has declined each survey cycle since 2002.

\* Hydrocarbon gas liquids (HGLs) include ethane, ethylene, propane, propylene, normal butane, butylene, ethane-propane mixtures, propane-butane mixtures, and isobutane produced at refineries or natural gas processing plants, including plants that fractionate raw natural gas liquids (NGLs). The MECS excludes natural gasoline from its definition because natural gasoline is not used as an energy source—fuel or feedstock—at manufacturing establishments.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

# Growth in gross output continues to outpace manufacturing energy consumption growth

**Manufacturing gross output and energy consumption, 1998–2022**  
billions of U.S. dollars and trillion British thermal units (Btu)

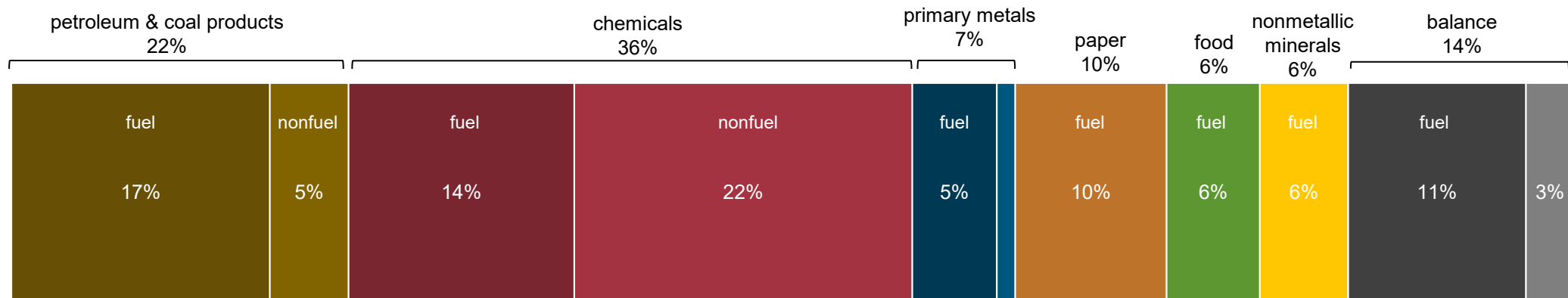


- Manufacturing gross output increased by 19% between 2018 and 2022. Manufacturing energy consumption increased by 6% over the same time period, to 20,687 trillion Btu in 2022.
- From 1998 to 2022, estimated manufacturing energy intensity decreased by 52%. During this same period, manufacturing gross output increased by 81%, implying continued long-term energy efficiency gains in U.S. manufacturing.

Data sources: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*;  
Bureau of Economic Analysis, *Gross Output by Industry*

## Nonfuel consumption is dominant in the chemicals sector

**Manufacturing energy fuel and nonfuel (feedstock) consumption by sector, 2022**  
percentage



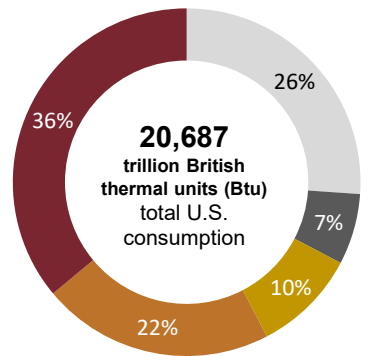
**total consumption:**  
20.7 quadrillion Btu  
**total nonfuel:**  
6.4 quadrillion Btu

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

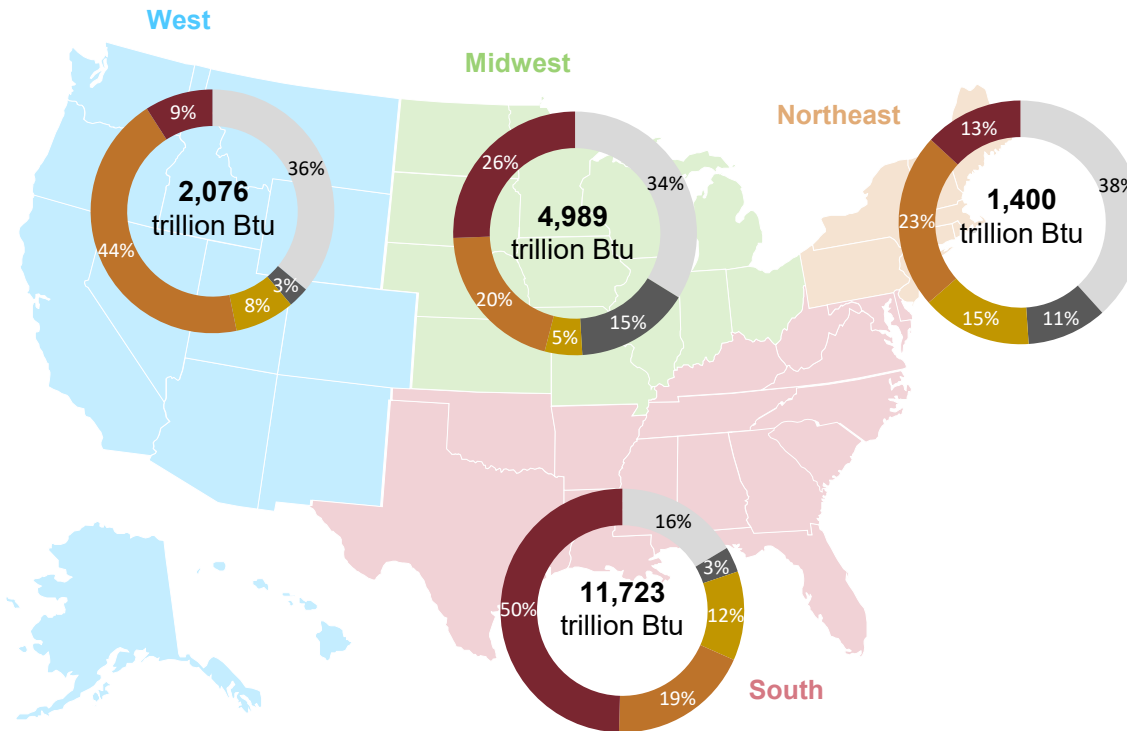
- Chemicals (70%), petroleum and coal products (16%), and primary metals (4%) account for nearly all feedstock used in manufacturing.
- Petroleum and coal products, chemicals, primary metals, paper, food, and nonmetallic mineral products account for 84% of fuel used in manufacturing.

# Four sectors account for most manufacturing energy consumption

Proportion of total energy consumption by sector and region, 2022  
percentage



chemicals  
petroleum and coal products  
paper  
primary metals  
all other industries



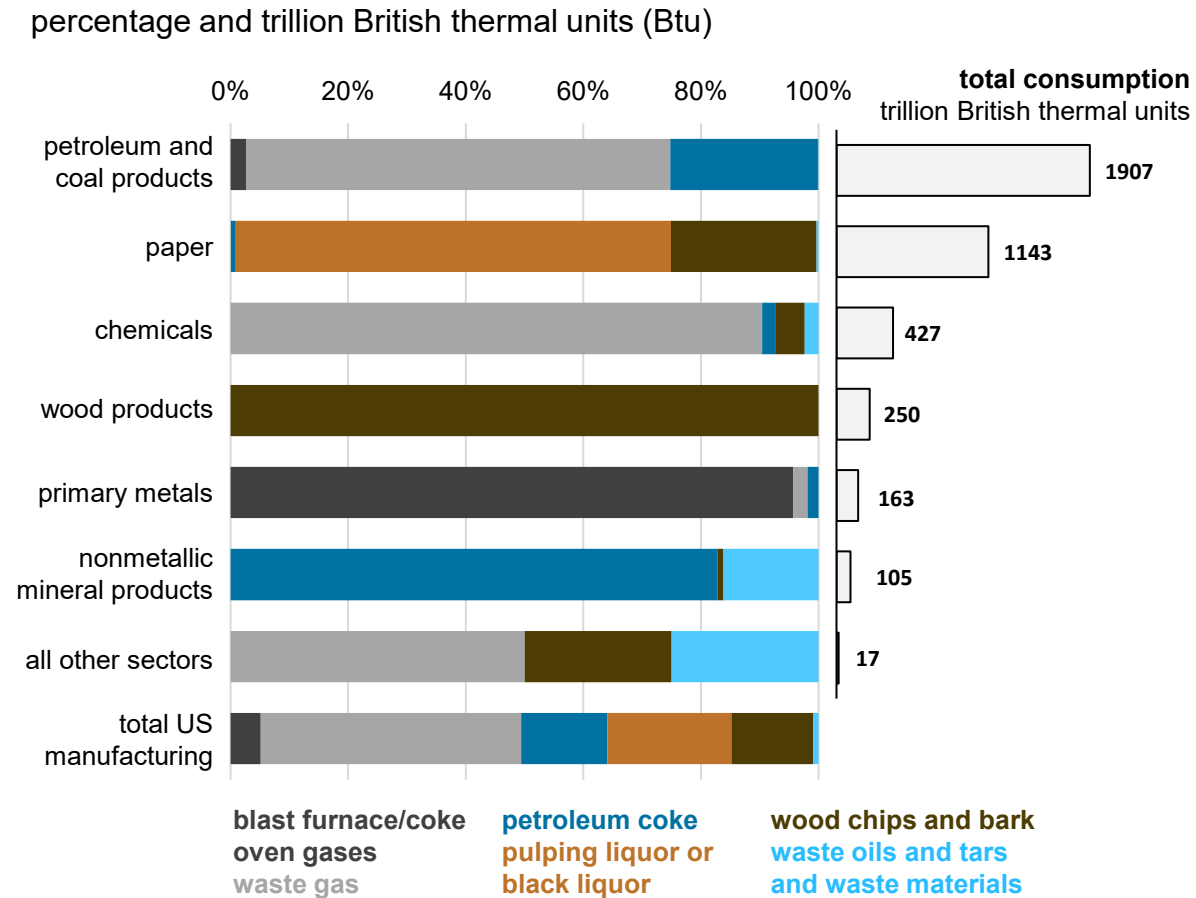
eia

- The chemical, petroleum and coal products, paper, and primary metals sectors accounted for 74% of manufacturing energy consumption in 2022.
- Manufacturing energy consumption was greatest in the South, and chemical manufacturing accounted for half of the South's energy consumption.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

## Byproducts in fuel consumption vary by sector

**Selected byproducts used in fuel consumption by sector, 2022**  
percentage and trillion British thermal units (Btu)

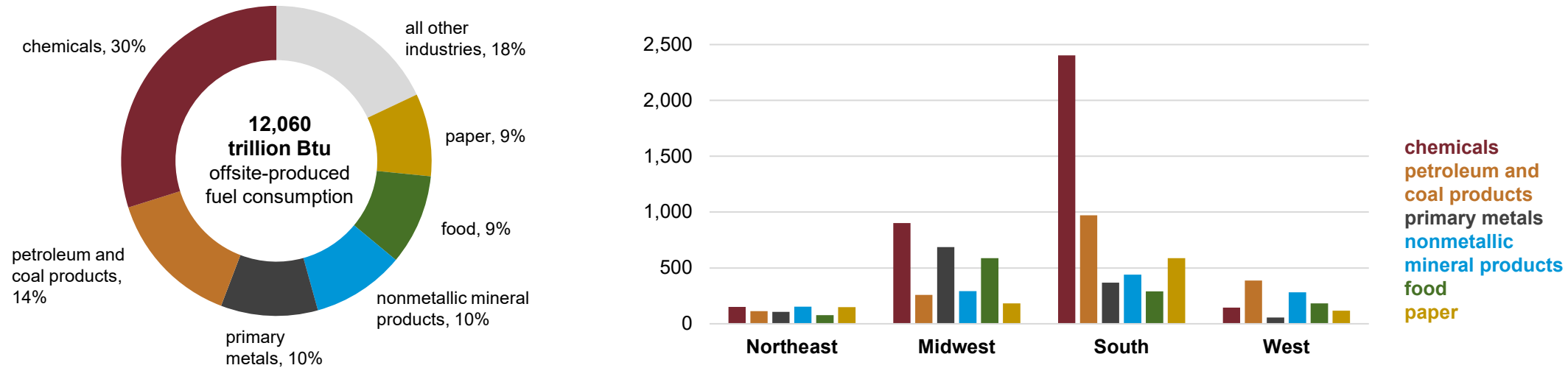


- Waste gas (for example, still gas, refinery gas, off gas, and vent gas) accounted for 44% of the manufacturing byproducts consumed as fuel, the largest share.
- Pulping liquor, or black liquor, accounted for 21% of manufacturing byproducts, all of which was consumed by the paper sector (846 trillion British thermal units).
- Of all byproducts consumed in primary metals, blast furnace/coke oven gas constituted 96%.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

## Six sectors accounted for more than three-fourths of offsite-produced fuel consumption

**Offsite-produced fuel consumption by region and top six consuming sectors, 2022**  
percentage and trillion British thermal units (Btu)



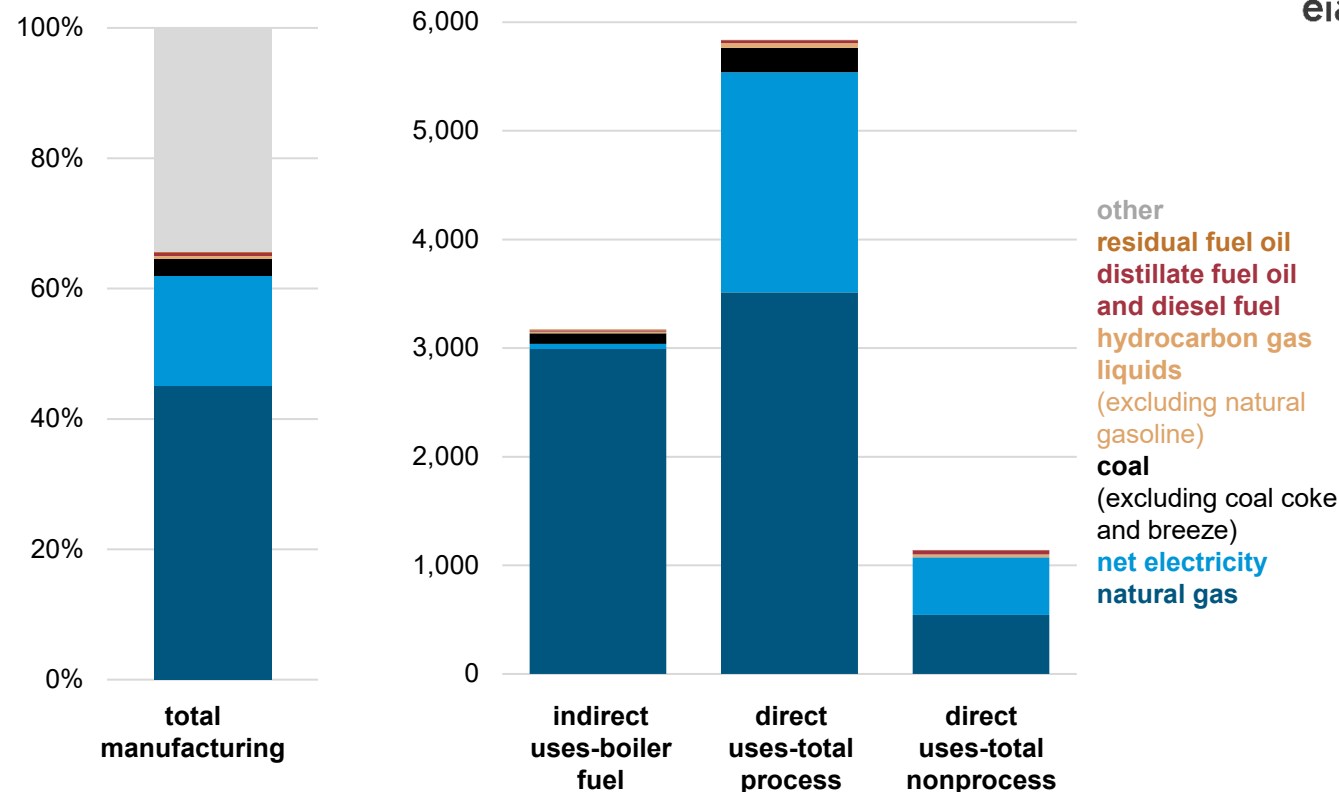
Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

- Chemicals, petroleum and coal products, primary metals, nonmetallic mineral products, food, and paper together accounted for 9,893 trillion Btu (82%) of offsite-produced fuel consumed in manufacturing.
- Offsite-produced fuel is a measure of fuel consumption (which is equivalent to purchased fuel), transfers of fuel onsite, and fuel produced offsite and consumed onsite. It excludes fuel produced and consumed onsite, energy used as raw material input, and electricity losses. An example of onsite-produced fuel is the production of black liquor in the pulping process to make paper and the subsequent use of the produced black liquor as a fuel at pulp and paper mills.

# Natural gas was the most-used fuel for all end uses

## End uses of fuel consumption, 2022

percentage and trillion British thermal units (Btu)

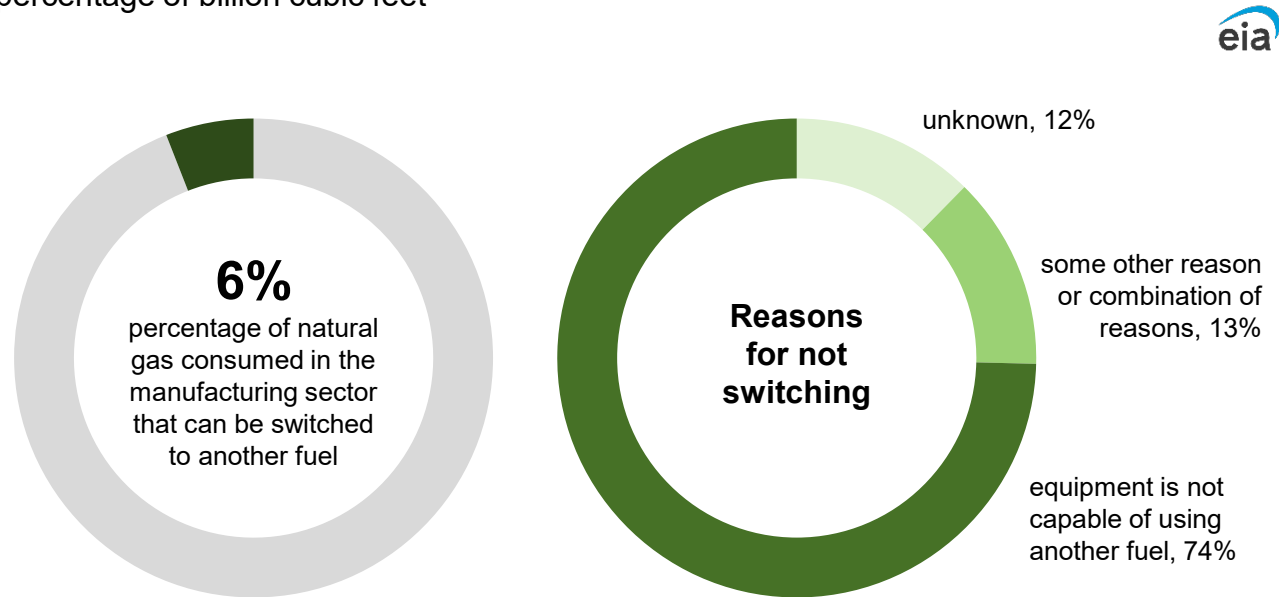


Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

- Natural gas accounted for 45% of manufacturing fuel consumption (7,087 trillion Btu) in 2022. It accounted for 43% of manufacturing fuel consumption in 2018.
- Direct process uses—which can include process heating, process cooling and refrigeration, and electro-chemical processes—made up the largest share of reportable consumption, followed by indirect uses and direct nonprocess uses.
- Examples of direct total nonprocess end uses include facility lighting, heating, ventilation, and air conditioning (HVAC), onsite transportation, and conventional electricity generation.

# Most sectors cannot easily switch from natural gas to another fuel

**Non-switchable natural gas and reasons that made natural gas unswitchable, 2022**  
percentage of billion cubic feet



- Overall, 94% of the natural gas used in the manufacturing sector in 2022 could not be replaced with an alternative fuel.
- The most common reason manufacturers could not switch from natural gas to other fuels (such as coal, fuel oils, electricity, or HGLs) was that their equipment could not use another fuel.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

# Manufacturing energy expenditures and economic characteristics

*Manufacturing energy expenditures* are funds spent for energy purchased and paid for or delivered to a manufacturer during a calendar year. For the MECS, expenditures include state and local taxes and delivery charges.

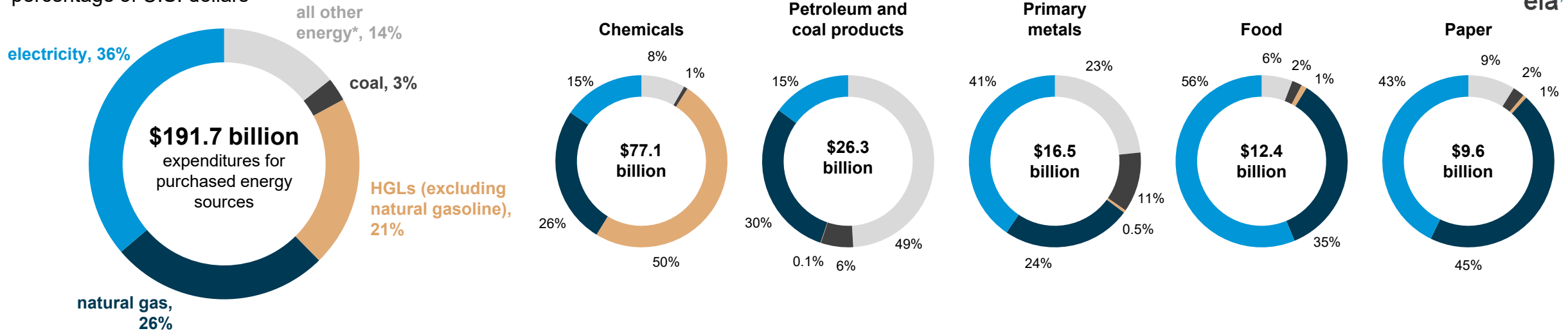
Specific economic data—value of shipments and receipts, value added by manufacturing, and total number of employees—were not collected by the MECS. However, we acquired this data by linking the MECS energy data at the establishment level to the U.S. Census Bureau’s economic data in the manufacturing portion of the *Economic Census* or the *Annual Survey of the Manufactures*.

*Value of shipments and receipts* is the dollar value of products manufactured and sent to customers. It can be the total value of products received from various sources, such as suppliers, inter-plant transfers, or even the final customer if the shipment happens from the manufacturing facility. It captures the economic value of goods for the establishment.

*Value added by manufacturing* refers to the process of transforming raw materials into finished goods that have a higher market value due to the processes and enhancements applied during production.

## The top five energy-consuming sectors account for about three-fourths of energy expenditures

**Expenditures for purchased energy sources by source type, 2022**  
percentage of U.S. dollars



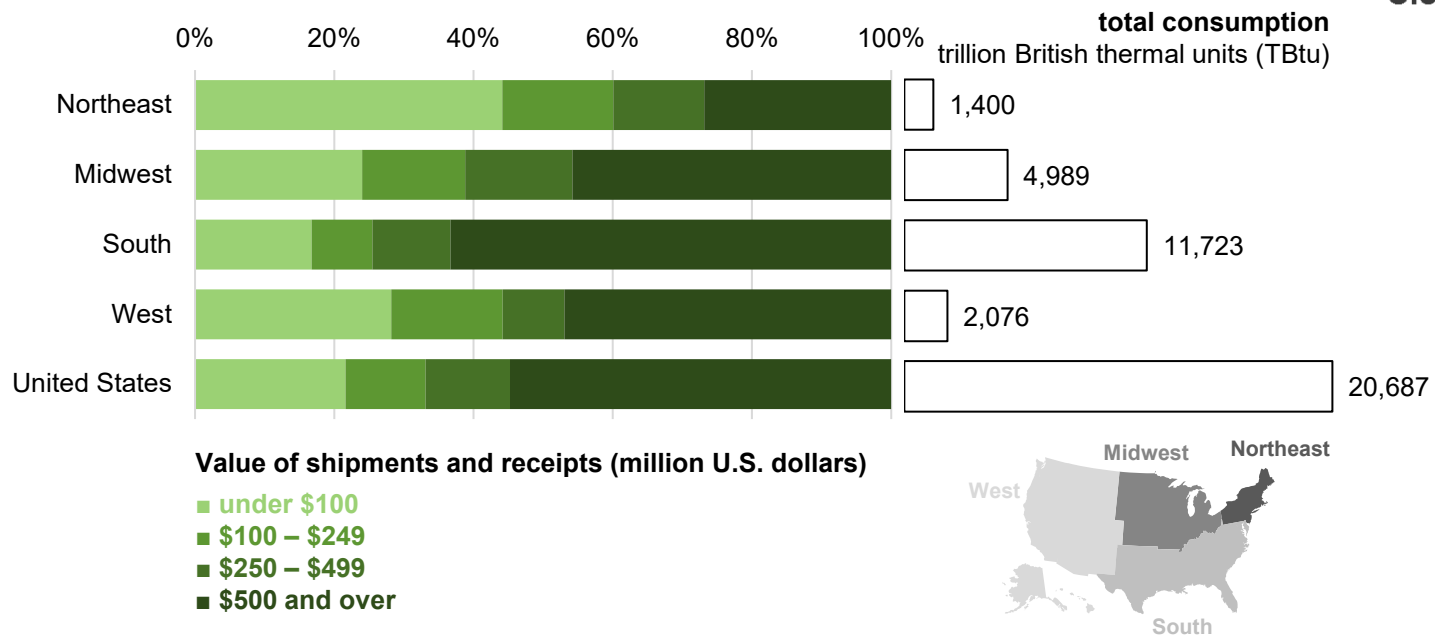
Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

\* Other energy sources include residual and distillate fuel oil, wood waste, hydrogen, and waste oils and tars.

- The chemicals, petroleum and coal products, paper, primary metals, food, and paper sectors accounted for 74% of manufacturing energy expenditures in 2022.
- Expenditures from the chemical sector accounted for 40% of manufacturing expenditures. The chemicals sector purchased 98% of hydrocarbon gas liquids (HGLs) excluding natural gasoline and 40% of natural gas used across all manufacturing sectors.

## Establishments with the largest value of shipments and receipts accounted for over half of energy consumption

**Total energy consumption by value of shipments and receipts, 2022**  
percentage

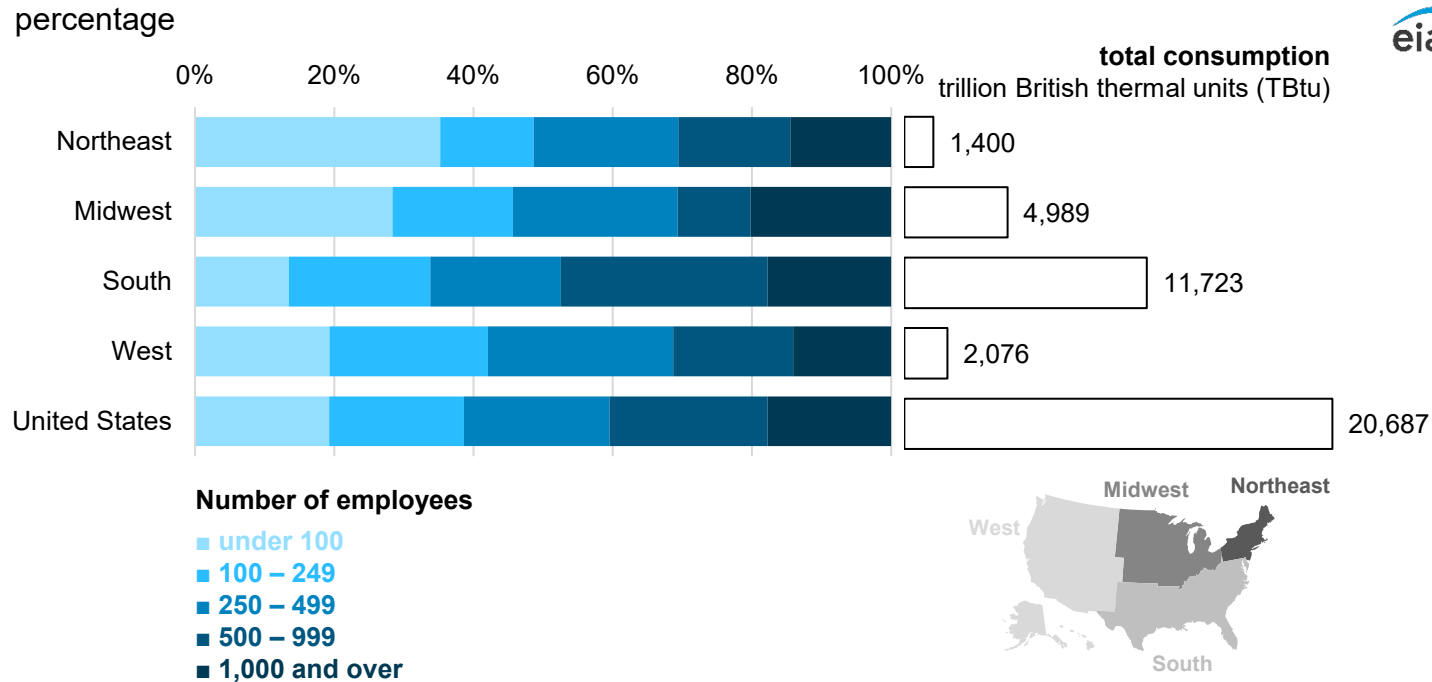


- More than half (55%) of manufacturing energy consumption came from establishments with a value of shipments and receipts over \$500 million.
- The South's largest share of energy consumption (63%) came from establishments with a value of shipments and receipts over \$500 million.
- The Northeast, which had the lowest energy consumption, had the largest share of establishments (44%) with a value of shipments and receipts under \$100 million.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

## At the national level, total consumption was similar across employment size categories

**Total energy consumption by employment size, 2022**  
percentage

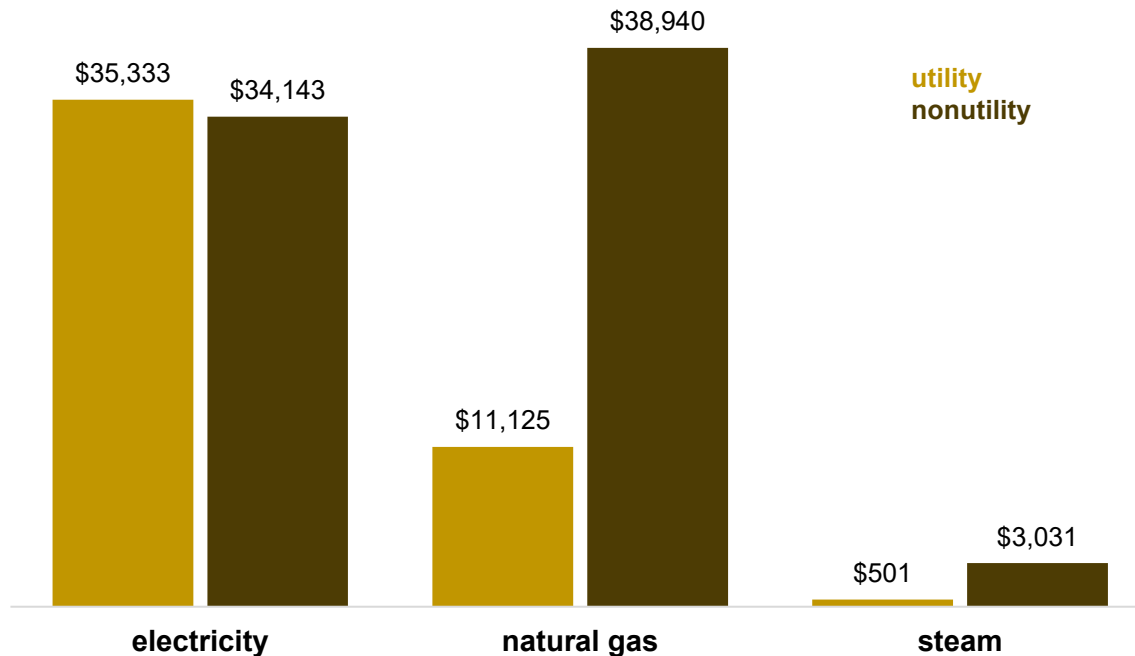


- At the national level, total energy consumption was similar across the employment size categories of manufacturing establishments.
- At the regional level, the distribution was less uniform. For example, almost half (48%) of the energy consumption in the South came from establishments with at least 500 employees.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

## Most natural gas and steam were purchased from nonutilities

Expenditures of purchased electricity, natural gas, and steam, 2022  
millions of U.S. dollars



Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

- Most (78%) natural gas was purchased from nonutilities.
  - A *utility*, sometimes referred to as a local distribution company (LDC), is a company in a local area that produces and delivers energy and is legally obligated to provide service to the public within its franchise area.
  - *Nonutilities* are not obligated to provide service to the public within a franchise area and can include independent power producers, brokers, marketers, marketing subsidiaries of utilities, or co-generators not owned by the manufacturer.
- The expenditures of purchased steam from nonutilities was six times larger than the expenditures from utilities (\$3.0 billion vs. \$501 million).

# References and additional information

## References

Gross output estimates are sourced from the Bureau of Economic Analysis, [Gross Output by Industry](#) data series. All other figures are sourced from Form EIA-846A/B, *Manufacturing Energy Consumption Survey*.

Please direct questions about the MECS to [eiainfoconsumptionefficiency@eia.gov](mailto:eiainfoconsumptionefficiency@eia.gov)



## Projected schedule of MECS releases

Consumption, end use, and fuel-switching tables | August 2025

Economic and expenditure tables | October 2025

Energy-management and count tables | December 2025

Hand-suppressed tables | March 2026



## For more information

U.S. Energy Information Administration homepage | [www.eia.gov](http://www.eia.gov)

Manufacturing Energy Consumption Survey | [www.eia.gov/consumption/manufacturing](http://www.eia.gov/consumption/manufacturing)

Consumption and Efficiency | <https://www.eia.gov/consumption>

Today in Energy | [www.eia.gov/todayinenergy](http://www.eia.gov/todayinenergy)

